SURFACE-WATER MANAGEMENT AND EROSION CONTROL PLAN

ON-SITE DISPOSAL FACILITY

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Fernald Environmental Management Project
Fernald, Ohio

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ACRONYM LIST

ARAR	Applicable or Relevant and Appropriate Requirement
BSL	Biodenitrification Surge Lagoon
CFR	Code of Federal Regulations
CQA	Construction Quality Assurance
DCP	Design Criteria Package
DOE	United States Department of Energy
E&S	Erosion and Sediment
FEMP	Fernald Environmental Management Project
LCS	Leachate Collection System
LTS	Leachate Transmission System
OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
ODNR	Ohio Department of Natural Resources
OSDF	On-Site Disposal Facility
OU2	Operable Unit 2
OU5	Operable Unit 5
ROD	Record of Decision
SWMEC	Surface Water Management and Erosion Control

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1.0 INTRODUCTION

1.1 Overview

This Surface-Water Management and Erosion Control (SWMEC) Plan describes the surface-water management and erosion control practices to be followed within the battery limit of the Fernald Environmental Management Project (FEMP) On-Site Disposal Facility (OSDF), Fernald, Ohio. The guidance provided in this document applies to the use of engineered features designed to manage surface water, minimize erosion, and control off-site sedimentation.

This plan addresses surface-water management and erosion control practices throughout the construction, impacted material placement, and closure of the OSDF. This plan does not address surface-water management and erosion control practices during or beyond the 30-year post-closure period prescribed in the *"Final Record of Decision for Remedial Actions at Operable Unit 2" (OU2 ROD)* [DOE, 1995a]. Those activities are addressed in the *OSDF Post-Closure Care and Inspection Plan*.

1.2 Project Description

The construction, impacted material placement, and closure of the OSDF is currently scheduled to occur over a period of approximately 7 years, as described in the Accelerated Remediation Plan. However, due to the potential for variations in the pace of remedial action activities, the OSDF has been designed to be constructed, impacted material placed, and closed in phases.

The design approach for the OSDF is presented in the document, *"Final Remedial Design Work Plan for Remedial Actions at Operable Unit 2"* [DOE, 1995b]. The design of the OSDF as currently developed, is presented in the *"Final Design Package, On-Site*

Disposal Facility" [GeoSyntec, 1997c]. The *"Final OSDF Design Criteria Package" (DCP)* [GeoSyntec, 1997e] for the OSDF requires preparation of a SWMEC Plan to address the work scope identified in Section 1.3 of this plan. This SWMEC Plan also satisfies the applicable requirements identified in Section 2.0 of this plan.

1.3 Plan Scope

This SWMEC Plan establishes the surface-water management, erosion minimization, and sediment control practices that the Subcontractor shall follow to maintain the proper performance of the OSDF, and to minimize impacts to surrounding areas and stormwater conveyances from excessive sediment loading. The scope of this SWMEC Plan includes a description of the engineered features that will handle:

stormwater runon from outside the battery limit into the OSDF battery limit;

stormwater runoff from areas within the battery limit that will be discharged through the temporary and permanent drainage system of the OSDF; and

wastewater, which includes all waters that must be contained, collected, and ultimately discharged to the Biodenitrification Surge Lagoon (BSL).

Wastewater generated as a result of development of the OSDF area includes:

leachate from impacted material within each cell of the OSDF — leachate is defined to mean stormwater that percolates into the leachate collection system (LCS), and is discharged to the OSDF leachate transmission system (LTS); impacted material runoff retained within the OSDF cells may be pumped to the FEMP former production area storm drainage control system;

runoff from impacted-material staging areas within the OSDF battery limits; these wastewaters will be contained, collected, and discharged to the FEMP former production area storm drainage control system;

runoff from impacted-material haul roads within the OSDF battery limits; these wastewaters will be contained, collected, and discharged dependent on location of collection to the FEMP former production area storm drainage control system; and

perched ground water that seeps into excavations within the OSDF battery limits; these wastewaters will be contained, collected, and transferred to the FEMP former production area storm drainage control system.

The engineered features are described in Sections 4.0, 5.0 and 6.0 of this plan, in the Construction Drawings, and in the Technical Specifications.

1.4 Plan Organization

The remainder of this SWMEC Plan is organized as follows.

A description of the plans related to this SWMEC Plan is presented in the remainder of Section 1.0.

The requirements from the OSDF DCP applicable to this SWMEC Plan are described in Section 2.0.

General information regarding the development of the OSDF as it relates to this SWMEC Plan is presented in Section 3.0.

Soil stabilization controls are described in Section 4.0.

Runon/runoff controls are described in Section 5.0.

Sediment controls are described in Section 6.0.

References are presented in Section 7.0.

1.5 Related Plans

Several other support plans have been prepared for the OSDF remedial action project and should be used in conjunction with this SWMEC Plan. The other plans containing information relevant to this SWMEC Plan are listed below with a brief statement of the relationship to this plan.

OSDF Impacted Materials Placement (IMP) Plan [GeoSyntec, 1997b]. The *IMP Plan* contains the procedures that the Subcontractor shall use to place the impacted materials into the OSDF.

OSDF Borrow Area Management and Restoration (BAMR) Plan [GeoSyntec, 1997c]. The *BAMR Plan* contains the procedures that the Subcontractor shall use to develop, manage, and restore the on-site borrow area.

OSDF Systems Plan. The *Systems Plan* contains the procedures that the Subcontractor shall use to inspect and maintain the OSDF during construction, impacted material placement, and closure.

Final Design Package, On-Site Disposal Facility [GeoSyntec, 1997a]. This document provides project drawings and specifications that the Subcontractor shall follow during construction.

OSDF Construction Quality Assurance (CQA) Plan [GeoSyntec, 1997d]. The *CQA Plan* contains procedures to evaluate soils compaction and other features of the OSDF liner and final cover system.

OSDF Post-Closure Care and Inspection (PCCI) Plan. The *PCCI Plan* addresses inspection and maintenance of the surface-water management and erosion control features during the post-closure period.

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2.0 APPLICABLE REQUIREMENTS

2.1 Overview

Regulatory and other requirements applicable to this SWMEC Plan are contained in the OSDF Design Criteria Package *(DCP)* [GeoSyntec, 1997e]. These requirements take the form of applicable or relevant and appropriate requirements (ARARs) and to be considered criteria (TBCs) as determined by the record of decision for each of the various FEMP operable units, functional requirements, and general design criteria. The following requirements applicable to the SWMEC Plan were obtained from the *DCP*.

2.2 Applicable or Relevant and Appropriate Requirements

General ARARs that should be addressed by the Subcontractor are provided here.

No.	Title	Requirement
1.	Waste Storage Piles OAC 3745-56-51, 54 & 58, and 40 CFR §264.251 through .259	Collection and holding facilities associated with a runon and runoff control system must be inspected weekly and be emptied or otherwise managed expeditiously after storms to maintain design capacity of the system.
2.	Ohio Solid Waste Disposal Regulations OAC 3745-27-19(E)(26)	The integrity of the engineered components of the landfill facility shall be maintained and any damage to, or failure of, the components shall be repaired.

No.	Title	Requirement
3.	Ohio Solid Waste Disposal Regulations OAC 3745-27-19(J)(1),(4)	Surface water shall be diverted from areas where solid waste is being, or has been, deposited. The facility shall be designed, constructed, maintained, and provided with surface water control structures, as necessary, to control runon and runoff of surface water to ensure minimal infiltration of water through the cover material and cap system, and minimal erosion of the cover material and cap system. If ponding or erosion occurs on areas of the landfill facility where solid waste is being, or has been, deposited, action will be taken to correct the conditions causing the ponding or erosion.
4.	Ohio Solid Waste Disposal Regulations OAC 3745-27-11(H)	At final closure of a landfill facility, all land surfaces shall be graded to prevent ponding of water where solid waste has been placed. Drainage facilities shall be provided to direct surface water from the landfill facility.
5.	Ohio Solid Waste Disposal Regulations OAC 3745-27-11(O)	Closure of the sanitary landfill facility must be completed in a manner that minimizes the need for further maintenance and minimizes post-closure formation and release of leachate and explosive gases to surface water to the extent necessary to protect human health and the environment.

2.3 Functional Requirements

The *DCP* contains a variety of functional requirements that have been established for the OSDF. The functional requirements that the Subcontractor shall meet applicable to the SWMEC Plan are:

route surface water to designated locations where it can be

appropriately managed;

protect the OSDF from damage caused by precipitation and stormwater runon and runoff; and

discharge surface water to existing watercourses in accordance with applicable regulatory and DOE requirements.

The Subcontractor shall develop a surface water management system that performs in a manner that meets the project requirements for both temporary conditions (*i.e.*, during construction, impacted material placement, and closure of the OSDF) and long-term conditions (*i.e.*, after closure of the OSDF). The system shall prevent stormwater runon to the OSDF and uncontrolled stormwater and wastewater runoff from the OSDF. Features of the long-term surface-water management system shall be constructed to require minimal monitoring and maintenance. The system shall be integrated, to the extent possible, with existing topography, features, and facilities.

2.4 Design Criteria

The *DCP* also identifies a number of design criteria for the OSDF. The Subcontractor shall incorporate these criteria in its plan to manage stormwater and control erosion. The applicable design criteria are:

temporary erosion and sediment (E&S) control features for the OSDF shall be designed for the 25-year, 24-hour storm event [ARARs: 40 CFR §258.26 and OAC 3745-27-08(C)(6)(a) and (b)];

temporary E & S control features shall be designed to minimize silting and scouring [ARAR: OAC 3745-27-08(C)(6)(c)];

temporary sediment ponds or basins, if used, shall be

designed following the criteria of OEPA [ARAR: OAC 3745-27-08(C)(6)(d)];

long-term E&S control features for the OSDF shall be designed for the 2,000-year, 24-hour storm event (design criterion for assumption of a DOE Performance Category 2 facility); and

long-term runon/runoff control structures for the OSDF shall be designed to limit interruption and damage (*i.e.*, washout) of the OSDF in the 2,000-year, 24-hour storm event (design criterion for assumption of a DOE Performance Category 2 facility); runon should be controlled and diverted away from and around the OSDF using swales, channels, or diversion berms.

2.5 Other Requirements

In addition to the requirements contained in the DCP, the Subcontractor shall incorporate the following other requirements into the plan to manage stormwater and control erosion:

disturbed areas shall be stabilized (*i.e.*, vegetated) after the area has been constructed to final grade;

general practices for construction, inspection, and maintenance of erosion and sediment control features shall be as recommended by the Ohio Department of Natural Resources (ODNR) Division of Soil and Water Conservation document entitled *"Rainwater and Land Development"* [ODNR, 1996]; and

temporary sediment basins shall be cleaned out to the design capacity when the sediment retained in the basin has reduced one-half of the basin's original storage depth [ODNR, 1996].

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3.0 OSDF DEVELOPMENT RELATED TO SURFACE-WATER MANAGEMENT AND EROSION CONTROL

3.1 Introduction

The OSDF is anticipated to be developed in stages (*e.g.*, early, middle, and final). In general, each stage consists of the construction of disposal cells, placement of impacted material in the disposal cells, and closure of the disposal cells. For the purposes of managing surface water and controlling erosion, each development stage is sub-divided as follows:

preconstruction period;

cell construction period;

impacted material placement period; and

closure period.

In addition, surface-water management and erosion control is anticipated to be maintained throughout the OSDF post-closure period; however, as stated previously in Section 1.1 of this plan, post-closure activities are outside the scope of this plan and will be addressed in a separate forthcoming plan.

In the remainder of the section, a description of the surface-water management and erosion control features needed for each of the aforementioned development periods is presented. The construction, inspection, and maintenance activities for the surface-water management and erosion control features are presented in the remaining sections of this plan.

3.2 Preconstruction Period

The preconstruction period is defined as the period of time prior to all construction. During this period, disturbed areas shall be kept to a minimum. Erosion prevention and sediment control deemed necessary by the Subcontractor shall be provided prior to earth disturbance. The first line of defense in minimizing soil erosion and sedimentation is the establishment of soil stabilization features. The following soil stabilization features shall be implemented during the pre-construction period:

in disturbed areas where additional grading or reworking is not scheduled for more than 45 days, temporary seeding and mulching will be applied to exposed soils within 7 days to stabilize soil and minimize erosion;

where additional grading or reworking is not scheduled for a year or more, disturbed areas will be permanently seeded and mulched as soon as possible to stabilize soil and reduce erosion; and

riprap will be applied within and along watercourses to prevent soil erosion under the design flow conditions.

Stormwater runon/runoff control measures shall be established to minimize erosion and off-site sedimentation. These features shall also be used to divert stormwater away from contaminated areas, thus maintaining separation between clean and potentially contaminated water. Runon to areas under construction shall be prevented by constructing runon diversion dikes and channels to route water to a natural watercourse. The location of these features shall be selected by the Subcontractor based on the sequence of construction activities.

The following runon/runoff control features may be used during the pre-construction period:

temporary sediment basins;

temporary drainage channels;

check dams;

temporary diversions;

silt fence; and

culverts.

Runoff from undisturbed areas shall be diverted from running on to the disturbed areas using temporary drainage channels, culverts, and temporary diversions.

Runoff from disturbed areas shall be diverted to a temporary sediment basin using temporary drainage channels, culverts, and temporary diversions.

3.3 Cell Construction Period

The cell construction period will include the excavation and construction of the OSDF disposal cells. The soil stabilization, runon/runoff control, and off-site sedimentation features used during this period will be the same as those used for the pre-construction period. The location of these features shall be selected by the Subcontractor based on the sequence of construction activities.

Wastewater encountered during the cell construction period will be limited to perched ground water. Perched ground water that enters the OSDF excavation shall be collected in a toe drain, or other suitable sump, and pumped or otherwise transferred to the FEMP former production area storm drainage control system.

3.4 Impacted Material Placement Period

The impacted material placement period includes placing impacted material in the cells. Features to manage surface water and control erosion and offsite sedimentation will be the same as those features used during the construction of the OSDF. The locations of these features shall be selected by the Subcontractor based on the sequence of construction activities.

In addition to these features, the leachate management system will be employed to contain leachate and impacted material runoff within the cells of the OSDF. These wastewaters shall percolate into the LCS and shall be discharged to the LTS or pumped to the FEMP former production area storm drainage control system. Specifically, wastewaters that will be encountered in the cell filling period of the OSDF should be managed as follows.

Leachate. All precipitation or other water that falls into an active (*i.e.*, in the process of having impacted material placed in accordance with the *IMP Plan*) OSDF cell and percolates into the cell LCS will be considered leachate. Placement of impacted material in OSDF cells shall be performed such that runoff from active and open portions of a cell can be managed within the cell. Runoff from the impacted material retained within the OSDF cells may be pumped to the FEMP former production area storm drainage control system.

Impacted Runoff. Runoff from impacted material staging areas and haul roads should drain to sumps or impacted runoff sediment control structures. Runoff from the staging area shall be discharged to the FEMP former production area storm drainage control system. Runoff from impacted material haul roads within the battery limit

should be contained, and allowed to flow by gravity, to the FEMP former production area storm drainage control system.

3.5 Closure Period

The closure period includes construction of the OSDF final cover system and the long-term surface-water management system. Features of the final cover system that may discharge stormwater to the permanent drainage structures includes the drainage layer and final cover surface.

The permanent drainage channels, which are located at the perimeter of the OSDF, are shown on the Construction Drawings.

During construction of the final cover system, the surface-water management and erosion and sediment control measures used during the cell construction period will remain in place as much as feasible.

3.6 Post-Closure Period

As stated previously in Section 1.1, this plan does not address surface-water management and erosion control practices during or beyond the post-closure period as they are outside the scope of this plan; those activities are addressed in the *OSDF Post-Closure Care and Inspection Plan*.

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4.0 SOIL STABILIZATION

4.1 Introduction

A description of the construction, inspection, and maintenance of the soil stabilization features for both temporary and long-term conditions are presented in this section. These features include:

temporary seeding and mulching;

permanent seeding and mulching; and

riprap.

The construction, inspection, and maintenance of these control features shall be based on standard engineering and soil conservation practices. The methods presented in this section are taken from the ODNR document entitled "*Rainwater and Land Development*" [ODNR, 1996]. The Subcontractor shall be prepared to implement other methods to control erosion of sediment at the site as deemed necessary by the Construction Manager.

4.2 Temporary Seeding and Mulching

4.2.1 Definition

Temporary seeding and mulching are common soil stabilization measures that serve to hold soil in place until permanent cover is provided at the time of final grading. Temporary seeding establishes a temporary vegetative cover on disturbed areas by seeding with the appropriate rapid growing plants and is essential to preserve the integrity of earthen structures used to control sediment, such as temporary diversion dikes and the banks and dams of sediment basins. Mulching involves the application of plant residues and other suitable materials to the soil surface and protects against rain, wind, and sun while seeds are germinating and helps to ensure a vegetative stand.

4.2.2 Purpose

The Subcontractor shall apply temporary seeding to:

reduce the erosion and sedimentation by stabilizing disturbed areas that will not be brought to final grade for a year or less;

reduce problems associated with mud or dust from bare soil surfaces during construction; and

reduce sediment runoff to downstream areas and improve the visual aspects of the construction area.

The Subcontractor shall apply mulch to:

inhibit erosion by protecting the soil surface from raindrop impact and reducing the velocity of overland flow; and

foster the growth of vegetation by increasing available moisture and providing insulation against extreme heat and cold.

4.2.3 Application

The Subcontractor shall apply temporary seed and mulch to soil surfaces where additional grading or reworking is not scheduled for a period of 45 days to less than one year.

Temporary seeding and mulching shall be applied in accordance with Section 02930 of the Project Specifications.

4.2.4 Maintenance

Where seeding does not establish as expected, the Subcontractor shall reseed and mulch the area within 3 weeks. The cause of the failure should be ascertained and corrected by the Subcontractor before reseeding. Physical conditions such as soil conditions may be unfavorable, resulting in the failure, and may require an alternative approach and/or type of cover. Areas requiring reseeding shall be prepared in the same manner as the original installation. Once established, a regular maintenance program will be performed.

The Subcontractor shall inspect applied mulch periodically, particularly after rainstorms, to check for rill erosion. Where erosion is observed, the Subcontractor shall apply additional mulch. Nets used to anchor mulch shall also be inspected after rainstorms for dislocation or failure. If washouts or breakage occur, reinstall nets as necessary after repairing damage to the slope. Inspections should take place until grasses are firmly established.

Additional temporary seeding and mulching planning considerations and design criteria are provided in *"Rainwater and Land Development"* [ODNR, 1996].

4.3 Permanent Seeding and Mulching

4.3.1 Definition

Permanent seeding and mulching shall be applied to establish permanent vegetation when an area has been brought to final grade and will not be subjected to disturbance for a year or more.

4.3.2 Purpose

The Subcontractor shall apply seeding and mulching to:

reduce erosion and decrease sediment yield from overland flow;

permanently stabilize disturbed areas in a manner that is economical, adaptable to site conditions, and allows selection of the most appropriate plant materials; and

stabilize drainage channels where concentrated flow occurs.

4.3.3 Application

The Subcontractor shall apply permanent seeding and mulching to:

disturbed areas where permanent, long-lived vegetative cover is needed to stabilize the soil; and

rough graded areas which will not be brought to final grade for a year or more.

Permanent seeding and mulching shall be applied in accordance with Section 02930 of the Project Specifications.

4.3.4 Maintenance

Maintenance for permanent seeding and mulching shall be performed in accordance with Section 4.2.4.

4.4 Riprap

4.4.1 Definition

Riprap is an erosion-resistant ground cover consisting of large, loose, angular stone installed wherever soil conditions, water turbulence and velocity, expected vegetative cover, etc., are such that soil may erode under design flow conditions.

4.4.2 Purpose

The Subcontractor shall place riprap to:

protect the soil surface from the erosive forces of concentrated runoff;

slow the velocity of concentrated runoff while enhancing the potential for infiltration; and

stabilize slopes with seepage problems and/or erosive soils.

The Subcontractor shall calculate the size and areal extent of the riprap based on surface-water calculations performed in accordance with Section 2.0 of the SWMEC Plan.

4.4.3 Application

The Subcontractor shall place riprap at soil-water interfaces where the soil conditions, water turbulence and velocity and, expected vegetative cover are such that the soil may erode under the design peak flow conditions. Typical uses of riprap may be at storm drain outlets, on channel banks and/or bottoms, within drainage channels, or at the toe of slopes.

The Subcontractor shall place riprap in accordance with the following minimum guidelines:

Riprap used at channel transitions shall extend upstream and downstream of the transition a distance of five times the downstream channel depth; the minimum extension should be 15 ft (4.5 m).

Riprap used at culvert exits shall have a minimum width of 4 ft. wider than the pipe diameter and a minimum width based on calculated peak flow velocities using Figure 2-3 of ODNR [1996].

Geotextiles shall be used to control piping and erosion beneath riprap in temporary facilities. Geotextiles shall meet the requirements of Section 02714 of the Project Specifications.

"Rainwater and Land Development" [ODNR, 1996] should be consulted for additional design criteria and planning considerations.

4.4.4 Maintenance

Once riprap has been installed it should require little maintenance though the Subcontractor shall periodically inspect riprapped areas to determine if high flows have caused scour beneath the riprap or dislodged any of the stone. If repairs are needed, the Subcontractor shall accomplish such repairs within the same work day.

4.5 Construction Entrance

4.5.1 Definition

A construction entrance is a stabilized pad of aggregate over a geotextile base and is used to reduce the amount of mud tracked off-site with construction traffic.

4.5.2 Purpose

The Subcontractor shall use a construction entrance:

where construction vehicles leave active construction areas;

at all points of egress to public roads; and

where frequent vehicle and equipment ingress/egress is expected.

4.5.3 Application

The Subcontractor shall build construction entrances in accordance with ODNR [1996, page 158].

4.5.4 Maintenance

The Subcontractor shall inspect the construction entrances on a weekly basis, and after rainstorms. The Subcontractor shall follow the maintenance guidelines provided in ODNR [1996, page 158].

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5.0 RUNON/RUNOFF CONTROLS

5.1 Introduction

A description of the construction, inspection, and maintenance of the runon/runoff control features for both temporary and long-term conditions are presented in this section. These features include:

temporary diversions;

temporary drainage channels;

permanent drainage channels;

check dams; and

culverts.

The construction, inspection, and maintenance of these control features shall be based on standard engineering and soil conservation practices. The methods presented in this section are taken from the ODNR document entitled *"Rainwater and Land Development"* [ODNR, 1996]. The Subcontractor shall be prepared to implement other methods to control erosion of sediment at the site as deemed necessary by the Construction Manager.

5.2 Temporary Diversions

5.2.1 Definition

Temporary diversions consist of an earth channel constructed across the slope. Adjoining the channel and on the lower side of the slope, a berm is constructed from material taken from the channel to help divert and contain flow in the channel. A detail of a temporary diversion is illustrated in ODNR [1996, page 156].

5.2.2 Purpose

In general, temporary diversions are intended to prevent erosion. This is accomplished by diverting water (overland sheet flow) from areas where the water may cause erosion to areas where the water can be used or disposed safely.

The Subcontractor shall use temporary diversions to:

divert stormwater runon away from contaminated areas of the OSDF;

divert stormwater runoff away from unprotected slopes to a stabilized outlet;

divert sediment-laden runoff from a disturbed area to a temporary sediment basin; and

shorten the flow length within a long sloping drainage area.

5.2.3 Application

The Subcontractor shall construct temporary diversions in areas where runoff from higher-lying areas have the potential to damage or is damaging: (i) lower-lying areas; (ii) cut or fill slopes or steeply sloping land; (iii) critical sediment source areas; and (iv) active gullies or other erodible areas.

Temporary diversions shall have stable outlets. The Subcontractor shall stabilize the diversions throughout its planned life. Guidelines for stability are provided in ODNR [1996, page 156]. Diversions are not recommended below high sediment-producing areas unless land treatment practices or structural measures, designed to prevent damaging accumulations of sediment, are installed with or before the diversions. The Subcontractor shall locate the temporary diversions according to outlet condition, topography, land use, soil type, and length of slope. Temporary diversions must be located so that water will empty on established water disposal areas, a stable watercourse, waterway, or structure.

5.2.4 Maintenance

The Subcontractor shall regularly inspect and maintain temporary diversions as follows:

check for points of scour or bank failure, rubbish or channel obstruction, rodent holes, breaching or settling of the berm, excessive wear from pedestrian or construction traffic;

repair damage and remove deposits or sediment from the diversion; and

restabilize as needed.

If no sediment protection is provided, the Subcontractor shall periodically clean out accumulated sediment.

5.3 Temporary Drainage Channels

5.3.1 Definition

A temporary drainage channel is a natural or constructed channel or outlet shaped or graded to convey runon and runoff. The channel may have a protective lining of vegetation or erosion-resistant materials such as concrete, riprap, erosion mat, or grass.

All temporary drainage channels shall have stable outlets with adequate capacity for the designed peak flow. The outlet must discharge in such a manner as not to cause erosion. Outlets should be constructed and stabilized prior to the operation of the temporary drainage channels.

5.3.2 Purpose

The Subcontractor shall construct temporary drainage channels to provide for the conveyance of excess surface water from diversions and other erosion and sediment control

measures, or natural concentrations of flow without causing erosion or flooding.

5.3.3 Application

The Subcontractor shall construct temporary drainage channels as needed to manage runon and runoff and to control erosion resulting from concentrated runoff. Temporary drainage channels shall be designed based on surface water calculations performed in accordance with Section 2.0 of the SWMEC Plan. Whenever possible, temporary drainage channels shall be used in such a way that preserves the existing and permanent drainage systems. Temporary drainage channels shall generally be located in existing and permanent drainageways where water can drain in from all sides. In all situations, channels shall be located so that they do not make sharp, unnatural changes in direction of flow.

The proposed locations for temporary drainage channels shall be selected by the Subcontractor based on its sequence of construction activities. Supplemental measures, such as check dams may be used in conjunction with temporary drainage channels.

5.3.4 Maintenance

The Subcontractor shall inspect and maintain the temporary drainage channels in accordance with the following:

Inspection shall be frequent and repairs shall be made promptly as needed.

All temporary drainage channels shall be inspected immediately (*i.e.*, that work day, or the first work day) after each rainfall event and at least once each work day during prolonged rainfall. Necessary repairs to channels shall be made promptly.

Temporary drainage channels shall be kept clear of debris at all times.

The protective lining vegetation or erosion-resistant materials shall be maintained as built to prevent undermining, scour, or deterioration.

5.4 Permanent Drainage Channels

5.4.1 Definition

Permanent drainage channels consist of a series of channels designed for conveying runon and runoff away from the OSDF. Details of the permanent drainage channels are shown on the Construction Drawings. The Construction Drawings also show the proposed location of the permanent drainage channels for the OSDF.

5.4.2 Purpose

The permanent drainage channels shall be used to prevent stormwater runon and runoff from damaging the OSDF final cover system.

5.4.3 Application

The Subcontractor shall construct the permanent drainage channels at the perimeter of the OSDF as shown on the Construction Drawings. The permanent drainage system shall divert runoff from abutting land north and east of the facility and rejoin the existing drainage channels north and south of the FEMP former production area. The permanent drainage system shall be installed in phases as the OSDF is constructed and closed.

5.4.4 Maintenance

The Subcontractor shall inspect and maintain permanent drainage channels in accordance with the following:

Inspection shall occur periodically to ensure that the channels are free-flowing and not clogged with sediment or debris.

Permanent drainage channels shall be kept clear of debris at all times.

The protective lining of vegetation or erosion-resistant materials shall be maintained as built to prevent undermining, scour, or deterioration.

5.5 Check Dams

5.5.1 Definitions

Check dams consist of a section of rocks placed at the inlet, along the length, or at the outlet of a drainage feature. A detail illustrating a constructed check dam is provided in ODNR [1996, page 133].

5.5.2 Purpose

Check dams may be installed in temporary diversions and temporary and permanent drainage channels to reduce erosion.

5.5.3 Application

The Subcontractor shall install check dams in accordance with ODNR [1996, page 133].

5.5.4 Maintenance

The Subcontractor shall inspect and maintain check dams in accordance with the following:

Inspection shall occur periodically to ensure that the structures have not been damaged by high energy flows. Repairs shall be made promptly, as needed.

All check dams shall be inspected immediately (*i.e.*, that work day, or the first work day) after each rainfall event and at least once each work day during prolonged rainfall. Necessary repairs shall be made promptly.

Check dams shall be maintained as built.

5.6 Culverts

5.6.1 Definition

Culverts are temporary or permanent structures used to convey stormwater beneath a road or other embankment.

5.6.2 Purpose

The Subcontractor shall install culverts to provide:

Temporary means to convey stormwater under construction and operation-related roads; and

Permanent means to convey stormwater under OSDF access roads.

5.6.3 Application

The Subcontractor shall install temporary culverts as needed to manage runon and runoff. The Subcontractor shall design temporary culverts based on surface water calculations performed in accordance with Section 2.0 of the SWMEC Plan. Temporary culverts shall also be designed to withstand construction traffic loading. The size and locations of permanent culverts are shown on the Construction Drawings.

5.6.4 Maintenance

The Subcontractor shall inspect and maintain the culverts as follows:

Periodic inspection shall be performed to ensure that the culverts are clear and not damaged.

Maintenance shall be performed as needed in a timely manner to ensure that culverts are functioning as designed. This shall include removal and disposal of any trapped sediment or debris.

6.0 SEDIMENT CONTROL

6.1 Introduction

A description of the construction, inspection, and maintenance of the sediment control features for both temporary and long-term conditions are presented in this section. These features are:

silt fences; and

temporary sediment basins.

The construction, inspection, and maintenance of these control features should be based on standard engineering and soil conservation practices. The methods presented in this section are taken from the ODNR document entitled *"Rainwater and Land Development"* [ODNR, 1996]. The Subcontractor shall be prepared to implement other methods to control erosion of sediment at the site as deemed necessary by the Construction Manager.

6.2 Silt Fences

6.2.1 Definition

A silt fence is a temporary sediment barrier constructed of posts and filter fabric. The filter fabric is stretched across and attached to the supporting posts and is entrenched. The silt fence is placed on the level contour of the land near the toe of a slope. It can also be placed in a minor drainage way to intercept and detain sediment and decrease flow velocities from drainage areas of limited size.

6.2.2 Purpose

The Subcontractor shall use silt fences to:

intercept and detain small amounts of sediment from disturbed areas during construction operations in order to prevent sediment from leaving the site; and

decrease the velocity of sheet flows and low-to-moderate level channel flows.

6.2.3 Application

The Subcontractor shall install silt fences on the downslope side of areas to be disturbed until permanent drainage and erosion control structures are established. The silt fence shall be placed on the level contour of the land near the toe of the slope. A silt fence should not be placed directly at the toe of the slope if it is at all possible to place it several (preferably at least five feet horizontal distance) away. Criteria for establishing silt fence locations is provided on ODNR [1996, page 119].

Under no circumstances shall the Subcontractor install silt fences in streams or in channels where flows are likely to exceed 1 cubic foot per second (cfs).

6.2.4 Maintenance

The Subcontractor shall inspect and maintain all silt fences in accordance with the following.

Daily inspection of the silt fence to identify areas that require repair or removal of accumulated sediment.

Silt fences shall be inspected immediately (*i.e.*, that work day, or the first work day) after each rainfall and at

leastonce each work day during prolonged rainfall. Any required repairs shall be made within the same work day.

Accumulated silt and debris shall be removed from behind the face of the silt fence when the silt fence deposits reach approximately one-half the height of the fence.

If runoff overtops the silt fence, flows under or around the ends, or in any other way becomes a concentrated flow, one of the following shall be performed as appropriate: (a) change the layout of the silt fence, (b) remove the accumulated sediment, or (c) install a different erosion and sediment control measure.

Sediment deposits should be removed after each rainfall event (*i.e.*, that work day, or the first work day after the rainfall event).

The expected usable life of a silt fence is 6 months. Should the fabric on a silt fence decompose or become ineffective prior to the end of the expected usable life and the fence is still necessary, the fabric shall be replaced promptly.

Any sediment deposits remaining in place after the silt fence is no longer required shall be dressed to conform with the existing grade, prepared, and seeded.

6.3 Temporary Sediment Basins

6.3.1 Definition

A temporary sediment basin is a structure designed to catch and store sediment and other waterborne debris.

6.3.2 Purpose

Temporary sediment basins are constructed downgradient of construction activities. Sediment basins are not 100 percent effective in trapping sediment which flows into them. Therefore, they should be used in conjunction with erosion control measures such as temporary seeding, mulching, diversions, etc. to reduce the amount of sediment flowing into the basin. Temporary sediment basins shall receive only stormwater runoff, not wastewater.

6.3.3 Application

The Subcontractor shall construct temporary sediment basins in accordance with plans and specifications to be provided by the Construction Manager. Temporary sediment basins will be located to intercept the largest possible amount of runoff from the disturbed areas. Temporary sediment basins shall be removed within 36 months after its construction or after the exposed areas are adequately protected against erosion by vegetative or mechanical means as directed by the Construction Manager.

Removal of a temporary sediment basin shall consist of:

draining the sediment basin of all water;

removing the sediments from the basin;

removing primary and emergency spillways and appurtenances;

grading the sediment basin to the lines and grades provided by the Construction Manager; and

revegetating disturbed areas.

6.3.4 Maintenance

The Subcontractor shall inspect and maintain the temporary sediment basins. Inspections shall be performed following rainstorms. Regular maintenance shall include repair of eroded areas, replacement of vegetation or riprap around the basins, repair of damaged or clogged spillways in the basins, and removal of sediment from the basins. Sediment shall be removed from the basins when the sediment has filled one-half the basin's original depth.

6.4 Final Cover System

6.4.1 Definition

The final cover system of the OSDF shall consist of a layered combination of natural material (soil/rock) and synthetic components. A detail of the final cover system is shown in the Construction Drawings. The surface of the impacted materials shall be shaped/prepared for placement of the capping system. This system will include a composite cap overlain by the following layers:

drainage layer — placed above the composite cap to collect and convey water infiltrating the capping system with direct discharge to the permanent drainage system;

biointrusion layer — a biointursion barrier placed above the drainage layer to provide long-term protection from burrowing animals and vegetative root intrusion;

granular filter layer — placed above the biointrusion layer to separate the vegetative zone from the biointrusion layer and prevent loss of the soil from the vegetative zone into the biointrusion layer;

vegetative soil layer — consisting of a minimum of 6 in. of topsoil overlaying a minimum of 12 in. of soil suitable to support vegetative growth of sufficient thickness to maintain proper moisture control within the plant root zone; and

topsoil — surface cover/vegetation to provide, to the extent feasible, protection against erosion.

6.4.2 Purpose

The final cover system has been designed to satisfy the following general conditions:

isolate impacted material in the OSDF;
protect the OSDF from inadvertent intrusion;
promote vegetative growth;
limit infiltration into the facility after closure; and
minimize requirements for long-term inspection, maintenance, and repair.

6.4.3 Application

The final cover system shall be constructed when the waste in the OSDF has reached its design elevation. The exterior side slopes will be closed as soon as possible after the planned vertical extent of waste is achieved for each phase of placement activities.

In anticipation of a "seasonal" shutdown (*e.g.*, winter weather), the facility will be graded to promote proper drainage. Exposed surfaces will be covered with a layer of soil. An extended shutdown of the facility (greater than one year) may necessitate partial closures. In the event of an extended shutdown, a partial closure will be implemented, thus creating a cell within the overall OSDF. All slopes will be graded in compliance with applicable standards, then capped with the barrier layer, drainage layer, and vegetative zone.

6.4.4 Maintenance

The OSDF final cover system shall be maintained in accordance with the *OSDF Systems Plan*.

7.0 REFERENCES

GeoSyntec Consultants, *"Final Design Package, On-Site Disposal Facility, Fernald Environmental Management Project"*, GeoSyntec Consultants, Atlanta, GA, 1997a.

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Ohio Department of Natural Resources (ODNR), *"Rainwater and Land Development: Ohio's Standards for Stormwater Management, Land Development and Urban Stream Protection, Second Edition"*, ODNR Division of Soil and Water Conservation, Columbus, Ohio, 1996 [FORMERLY U.S. Department of Agriculture-Soil Conservation Service (USDA-SCS), *"Water Management and Sediment Control in Urbanizing Areas"*, U.S. Department of Agriculture, Soil Conservation Service, Washington, D.C., 1987].

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